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# CHEMISTRY.

## No. I.

## MAGNETS.

*The* SILVER ISIS MEDAL *was presented to Mr.* RICHARD KNIGHT, *Jun., of Foster Lane, for his Experiments on the Texture of Steel, as affecting Magnets made of it.*

THE two conditions, according to Mr. Knight, that enable a bar of steel to receive and retain a high degree of magnetism, are, for the first, that the grain of the metal should be open, and, for the second, that it should be highly carbonised: it also conduces to the same end if the bar is hardened at the poles, to that degree that a file will just touch it.

In illustration of the importance of the above conditions, the following experiments were made:

1. A magnet was made of a bar of blistered steel, hammered smooth, but not so as to close the grain, the steel remaining fully carbonised. The quality of the magnet proved to be very good.
2. A bar of the same blistered steel as No. 1 was closed by hammering, till it became nearly as fine as the best shear steel: being then treated as No. 1, it produced a magnet of very inferior quality.

3. A bar of the same blistered steel was treated as No. 2, and afterwards was opened by exposure to a white heat. It was found to have an open grain, but, having lost in this last process nearly the whole of its carbon, it produced a magnet inferior to No. 2.
4. A bar of the same blistered steel was treated as No. 3, and was afterwards exposed to red heat, in contact with powdered charcoal, till it was reconverted into perfect steel. The magnet made of it proved very good, but not equal to No. 1.

Hence Mr. R. Knight concludes that open-grained blistered steel is well fitted for powerful magnets; that closing the grain by heating and hammering it, though it should still remain carbonised, greatly injures it, and that the subsequent action of heat, in opening it, though it much improves the quality, does not restore it to the same openness of grain that it had at first.

The keeper, or bar, which connects the two ends of a horse-shoe magnet, is better of soft iron than of steel, being able in the former case to support a greater weight before it gives way, than in the latter case.

The process according to which Mr. Knight makes his magnets, is as follows:

Having procured a bar of blistered steel of the required size, heat it sufficiently, so as to allow of closing the blisters, and thus making the surface smooth, which must be done by as little hammering as possible. The middle of the bar is then to be heated, so as to allow of its being bent, and brought to the required shape: the ends of the horse-shoe bar are now to be filed smooth and flat, in order that they may touch the keeper by the whole of their areas.

The bar is now ready for tempering, which is done by heating the two ends red-hot for about one-third of their respective distances from the bend, and then plunging it in cold water, by which the ends acquire such a degree of hardness as renders them just capable of yielding to a file.

The last process is magnetising the bar; which is done by laying it on a flat table, having its two ends connected by a soft iron keeper. The end which is to become the north pole being previously marked by a cut across it, another horse-shoe magnet, without its keeper, is to be held in the hand in a vertical position, the north pole outwards: it is then to be slid over the surface of the bar as it lies on the table, beginning at the north pole of this latter, and so continuing in an uninterrupted circuit all round the bar and its keeper, for ten or twelve times, and finally leaving off at the south pole. The bar will then be found to be fully saturated with magnetism.

If the newly formed magnet be now suspended, and weights be hung on the keeper till it separates from the magnet, and if the keeper be a second time applied to the magnet, and again separated as before, it will be found that the force required to cause the first separation is to that required to cause the second nearly in the proportion of ten to seven; but the power of the magnet does not appear to be weakened by any number of subsequent separations.